

PATENT APPLICATION TRANSMITTAL LETTER

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TO THE ASSISTANT COMMISSIONER FOR PATENTS

Transmitted herewith for filing under 35 U.S.C. 111 and 37 C.F.R. 1.53 is the patent application of:

JEFFREY L. HUCKINS

For: **CLIENT MESSAGING IN MULTICAST NETWORKS**

Enclosed are:

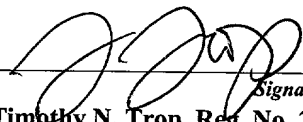
- ☒ Certificate of Mailing with Express Mail Mailing Label No. **EL594059831US.**
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For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	30	- 20 =	10	x \$18.00	\$180.00
Indep. Claims	5	- 3 =	2	x \$78.00	\$156.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
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Dated: **August 31, 2000**


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21906

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APPLICATION

FOR

UNITED STATES LETTERS PATENT

TITLE: **CLIENT MESSAGING IN MULTICAST NETWORKS**

INVENTOR: **JEFFREY L. HUCKINS**

Express Mail No.: EL594059831US

Date: August 31, 2000

CLIENT MESSAGING IN MULTICAST NETWORKS

Background

This invention relates generally to providing messages to clients in multicast networks.

5 A multicast network may enable messages to be sent to target groups of clients that constitute a subset of all of the networked clients. Generally, multicasting is accomplished by including, within a header for example, the addresses of all the subject clients that are addressed. Including a large number of addresses with a packet has the
10 distinct disadvantage that the message size can become very enlarged in networks with many clients. In particularly large networks, such as those that have nationwide coverage, the bandwidth of the network may be adversely affected by the need to include, within the message, addresses for a large subset of the clients on the network.
15

Thus, there is a need for ways to address a subset of clients within a network in a bandwidth efficient fashion.

In some cases, a given client may receive a variety of different types of messages. As one example, it may be
20 desirable to transmit software updates (that update the software on a group of clients) through a multicast network system. Thus, each client may receive conventional messages as well as software updates. Conventionally,

there is no way for the client that receives a message to immediately determine what to do with the message.

Thus, there is a need for a way to enable network clients to better handle diverse types of messages that may be received by the client.

Brief Description of the Drawings

Figure 1 is a schematic depiction of one embodiment of the present invention;

Figure 2 is a flow chart for software resident on the client shown in Figure 1 in accordance with one embodiment of the present invention; and

Figure 3 is a flow chart for software resident on the server or head end in accordance with one embodiment of the present invention.

Detailed Description

Referring to Figure 1, a network may include at least one server or head-end 10 and a plurality of clients 12 (only one of which is shown). The server 10 may be coupled to a plurality of clients (including the client 12) through a distribution system that may be based on a wired system or a wireless or broadcast system. Examples of such networks include television distribution networks such as digital video broadcasting systems.

In one embodiment of the present invention, the server 10 may communicate with the clients 12 over a transport 14.

The transport 14 may be in accordance with an analog or digital broadcasting system. As one example, the transport 14 may be compliant with the Digital Video Broadcast (DVB); Network-independent Protocol, ETS 300802, dated November 5 1997 and available from the European Telecommunications Standards Institute (ETS), Valbonne, France. The transport 14 may be a satellite, cable or airwave broadcasting system as examples.

10 In accordance with embodiments of the present invention, the client 12 recognizes messages directed individually to that client 12 from the server 10 or in some embodiments, from other clients 12. Bandwidth may be conserved by addressing messages to a group of clients without the need to insert, within header, the individual 15 identifiers of each of a large number of addressed clients.

In addition, the client 12 may include one or more addressable agents 44, 46 and 48 that may be independently addressed by remote units such as the server 10. Moreover, by providing addressable agents 44, 46 and 48 within a 20 given client 12, messages that are specialized or which need specialized handling may be addressed to particular agents resident on the client 12 for appropriate handling.

The server 10 may include a software download and update server 16. The server 16 is responsible for 25 transmitting software or software updates to the client 12.

The server 16 transmits messages which include a distinct service identifier (e.g., service_id=0x01).

5 The server 10 may also include an instant messaging or short message service (SMS) server 18 that also transmits messages having a distinct service identifier (e.g., service_id=0x02). The server 10 may also have any number of additional servers indicated collectively at 20 that may transmit messages, each having a unique service identifier (e.g., service_id=X).

10 In accordance with one embodiment of the present invention, the server 10 may implement a unidirectional messaging system. In a unidirectional messaging system, the server 10 may transmit messages to a plurality of clients that are unable to respond in any way. One example
15 of such a network is a direct-to-home (DTH) broadcast network that may be compliant with the DVB protocol. The network may use a connection oriented communication protocol or a real time connectionless communication protocol as two examples. There are many applications of
20 unidirectional messaging from server to client such as instant messaging, command and control and notification and signaling, as examples. In other cases, the network may be a bidirectional network, for example with an Internet Protocol (IP) multicast backbone.

25 In one embodiment of the invention, the server 10 may include a unidirectional messaging server (UMS) 22 that is

coupled to the servers 16, 18 and 20 to generate messages in an appropriate format. The messages transmitted by the UMS server 22 may include messages originally generated by one of the servers 16, 18 or 20. The UMS server 22 may
5 then be coupled to an Internet Protocol multicast module 24 that places the messages in an appropriate multicast protocol format. Finally, a DVB Multiprotocol Encapsulation (MPE) 26 is coupled to the Internet protocol multicast module 24. The MPE is described in DVB
10 Specification for Data Broadcasts (EN 301 192) and Specification for Service Information (SI) in DVB Systems (EN 300 468 V1.3.1 1998-02) both available from the ETS. The output of the DVB MPE 26 and a DVB-Service Information (SI) generator 28 are coupled to the transport 14. Service
15 Information is digital data describing the delivery system, content and scheduling/timing of broadcast data streams.

In the client 12, the stream from the DVB-SI generator 28 is coupled to a DVB-SI receiver 40 and service acquisition module 38. The service acquisition module 38
20 extracts a program identifier (PID) and provides it to a DVB demultiplexer 32. A tuner 30 may tune the client 12 to the appropriate channel corresponding to the extracted program identifier.

The message from the DVB MPE 26 is provided to a DVB
25 MPE receiver 42. The receiver 42 communicates with an IP multicast module 40 and a unidirectional messaging server

38. The server 38 breaks down the message to determine whether a service identifier was included in the data stream. If so, the message is forwarded to an appropriate agent designated to receive messages with particular service identifiers.

Thus, in one embodiment of the present invention, the software download and update server 16 may provide a specific message identifier that causes its message to be received by a software download agent 48 tuned to a particular service identifier. Similarly, messages from the instant messaging server 18 may include a service identifier that cause those messages to be forwarded to an instant messaging agent 46 in the client 12. Likewise, messages from other servers 20 may have appropriate identifiers that cause them to be shunted to particular agents 44 on the client 12.

The server 10 may include a storage 25 that stores software 70 for controlling the operation of the server 22. Likewise, the server 38 on the client 12 may be coupled to a storage 45 that stores software 50 that controls the operation of the server 38. The servers 22 and 38 may also be processor-based systems.

Turning next to Figure 2, the software 50 on the client 12 initially receives the unidirectional messaging server address and port from the server 10. The client 12 may also be assigned a client identifier as indicated in

block 52. Thus, an Internet Protocol multicast system may be established wherein each client has a UMS address and port as well as a unique client identifier, assigned by the server 10. In some embodiments, the server 10 may
5 dynamically adjust addresses and ports as well as client identifiers to enable communication of particular messages, message groups or types of messages to particular clients in a dynamic and reconfigurable fashion.

Having received its address, port and client
10 identifier, the client 12 receiver joins a multicast group and listens for messages addressed specifically to it or to any groups that the client 12 belongs to, as indicated in block 54.

A software download agent 48 registers its service
15 identifier with the UMS server 38 as indicated in block 56. When the UMS server 38 receives a packet with a UMS message, as indicated in block 58, a check determines whether the particular client 12 is the intended recipient as indicated in diamond 60. If not, the message is
20 discarded as indicated in block 62.

However, if the particular client 12 is the intended recipient, the server 38 checks the message's service identifier and passes the message to the correct agent 44, 46 or 48, as indicated in block 64. The message is then
25 delivered to the appropriate agent 44, 46 or 48, as indicated in block 66. In the agent, the information is

parsed and passed to an appropriate process for handling as indicated in block 68.

On the server side, shown in Figure 3, the network software 70 begins by assigning multicast addresses and ports for unidirectional messaging service to a plurality of clients 12 as indicated in block 72. The server 10 may also assign client identifiers in a dynamic and reconfigurable fashion. The address, port and client identifiers are then transmitted to the clients as indicated in block 74.

Thereafter, the software download and update server 16 may create a software version data structure and pass this data to the server 22 as indicated in block 76. The server 22 creates a unidirectional message and assigns a client value, sets a group flag, and copies private data in the private bytes of the message as indicated in block 78. More particularly, a unique client identifier may be assigned. The client identifier may either be a particular preassigned client identifier or, as one example, may be zero when multiple clients are targeted. A group flag may be a Boolean value specifying whether the client identifier is a group mask or a particular identifier. A group mask is an identifier that identifies a subset of the clients 12 on the network. This subset may include a plurality of clients but less than the total number of addressable clients.

As one example of a unidirectional message header, the message may include a number of variables including a group_mask, a service_id, a version_id, a message_id, and a private_data_byte. The group_mask may, in one embodiment
5 of the present invention, include 64 bits, the service_id may include eight bits, the version_id may include sixteen bits, the message_id may include eight bits and the private_data_byte may include eight bits. The group_mask may be exclusive ORed with the client identifier of each
10 unique client 12 to determine if the client 12 is the intended recipient. The version_id is the version of the unidirectional messaging protocol and may initially be set to zero. The service_id may be a service identifier that may be as two examples 0x01 for a software and download and
15 update service or 0x02 for an instant messaging service. Advantageously, the message size does not exceed 1,024 bytes in order to eliminate potential datagram fragmentation. The group_filter may be used in conjunction with the client_id field to limit the size of the private
20 data bytes required for an application. Each of header items may include an unsigned integer most significant bit first (uimbsf) identifier in accordance with the DVB specification except for the private_data_byte which may include a bit string, left bit first (bslbf) identifier.
25 As indicated in block 80, the message is then sent to all the clients 12 on the network. Each client then

determines whether the message is intended for that client. The client 12 determines whether it is the specific intended recipient by determining whether the message is addressed to the client identifier of the client 12. For example, using an AND logic operator between the message's identifier and the client's identifier, the client 12 may determine if the client 12 is within a group of clients jointly addressed by the server 10.

In one embodiment of the present invention, distinct groups of users may receive common client identifier elements. Thus, a plurality of clients whose owners have signed up for enhanced service may include a common code portion in their client identifier. When a message including that common code portion in the client identifier is received, each of those clients accepts the message. Likewise, clients in particular geographic areas, having particular interests or otherwise identifiable clients may be given unique prefixes/suffixes or identifier code portions. The code portion may be logically ANDed with a group_mask to determine whether a particular client is a member of the targeted group.

While the present invention has been described with respect to a limited number of embodiments, those skilled in the art will appreciate numerous modifications and variations therefrom. It is intended that the appended

claims cover all such modifications and variations as fall within the true spirit and scope of this present invention.

What is claimed is:

1. A method of determining a value of a function of a variable, the method comprising: receiving a value of the variable; and determining the value of the function of the variable based on the received value of the variable.

1 1. A method comprising:
2 assigning an individual identifier to the clients
3 comprising a set of clients;
4 assigning a group identifier to a subset of the
5 clients within the set of clients; and
6 enabling a first client in said set to determine
7 whether a message is sent to the first client or to the
8 subset.

1 2. The method of claim 1 further including sending a
2 single message to a subset of said clients.

1 3. The method of claim 1 including sending
2 television content to a plurality of clients.

1 4. The method of claim 1 wherein assigning an
2 individual identifier includes assigning a code portion
3 that identifies a particular client as belonging to a
4 subset of clients within the set of clients.

1 5. The method of claim 4 including comparing a group
2 identifier, received by a client with a message, to the
3 client's individual identifier to determine whether the
4 particular client is within the addressed subset.

1 6. The method of claim 1 including addressing the
2 same message to a subset of clients.

1 7. The method of claim 1 including sending a message
2 to a client in a unidirectional messaging system.

1 8. An article comprising a medium storing
2 instructions that enable a processor-based system to:
3 assign an individual identifier to a client
4 comprising a set of clients;
5 assign a group identifier to a subset of the
6 client within the set of clients; and
7 enable a first client in said set to determine
8 whether a message is sent to the first client or to the
9 subset.

1 9. The article of claim 8 further storing
2 instructions that enable the processor-based system to send
3 a single message to a subset of said clients.

1 10. The article of claim 8 further storing
2 instructions that enable the processor-based system to send
3 television content to a plurality of clients.

1 11. The article of claim 8 further storing
2 instructions that enable the processor-based system to

3 assign a code portion that identifies a particular client
4 as belonging to a subset of clients within the set of
5 clients.

1 12. The article of claim 11 further storing
2 instructions that enable the processor-based system to
3 compare a group identifier, received by a client with a
4 message, to the client's individual identifier to determine
5 whether the client is within the address subset.

1 13. The article of claim 8 further storing
2 instructions that enable the processor-based system to
3 address the same message to a subset of clients.

1 14. The article of claim 8 further storing
2 instructions that enable the processor-based system to send
3 a message to a client in a unidirectional messaging system.

1 15. A method comprising:
2 providing at least two agents on a client;
3 assigning a different address to each of said
4 agents; and
5 determining whether a message received by said
6 client is addressed to one of said agents.

1 16. The method of claim 15 including sending at least
2 two different types of messages to said client.

1 17. The method of claim 16 including sending messages
2 including software and messages not including software.

1 18. The method of claim 17 including assigning
2 different addresses to messages to a client that include
3 software and messages that do not include software.

1 19. The method of claim 18 including addressing
2 messages including software to an agent on the client that
3 is adapted to handle the downloading of software.

1 20. The method of claim 15 including assigning an
2 individual identifier to the clients comprising a set of
3 clients, assigning a group identifier to a subset of the
4 clients within the set of clients, and enabling a first
5 client in said set to determine whether a message is sent
6 to the first client or the subset.

1 21. An article comprising a medium storing
2 instructions that enable a processor-based system to:
3 provide at least two agents on a client;
4 assign a different address to each of said
5 agents; and

6 determine whether a message received by said
7 client is addressed to one of said agents.

1 22. The article of claim 21 further storing
2 instructions that enable the processor-based system to send
3 at least two different types of messages to said client.

1 23. The article of claim 22 further storing
2 instructions that enable the processor-based system to send
3 messages including messages including software and messages
4 not including software.

1 24. The article of claim 23 further storing
2 instructions that enable the processor-based system to
3 assign different addresses to messages to a client that
4 include software and messages that do not include software.

1 25. The article of claim 24 further storing
2 instructions that enable the processor-based system to
3 address messages including software to an agent on the
4 client, said agent adapted to handle the downloading of
5 software.

1 26. The article of claim 21 further storing
2 instructions that enable the processor-based system to
3 assign an individual identifier to the clients comprising a

4 set of clients, assign a group identifier to a subset of
5 the clients within the set of clients and enable a first
6 client in the first set to determine whether a message is
7 sent to the first client or the subset.

1 27. A system comprising:
2 a processor-based device; and
3 a storage coupled to said device, said storage
4 storing instructions that enable the processor-based device
5 to assign an individual identifier to the clients
6 comprising a set of clients, assign a group identifier to a
7 subset of the clients within the set of clients and enable
8 a first client in said set to determine whether a message
9 is sent to the first client or to the subset.

1 28. The system of claim 27 wherein said system
2 distributes television content to a plurality of clients.

1 29. The system of claim 27 including a comparator
2 that compares a group identifier, received by a client with
3 a message, to the client's individual identifier to
4 determine whether the particular client is within the
5 addressed subset.

1 30. A system comprising:
2 a processor-based device; and

3 a storage coupled to said device storing
4 instructions that enable the processor-based device to
5 handle at least two agents on a client, assign a different
6 address to each of said agents and determine whether a
7 message received by the client is addressed to one of said
8 agents.

CLIENT MESSAGING IN MULTICAST NETWORKS

Abstract of the Disclosure

A messaging system may enable a server to assign unique identifiers to a plurality of clients. These identifiers enable a client to determine whether a message is specifically targeted to that client or, as an alternative, whether the client is a member of a group of targeted clients. In one embodiment, each client includes a client identifier that may include code portions that are common to other members of a particular addressable client group. In addition, the client may include agents devoted to particular functions that may be uniquely addressable by the server.

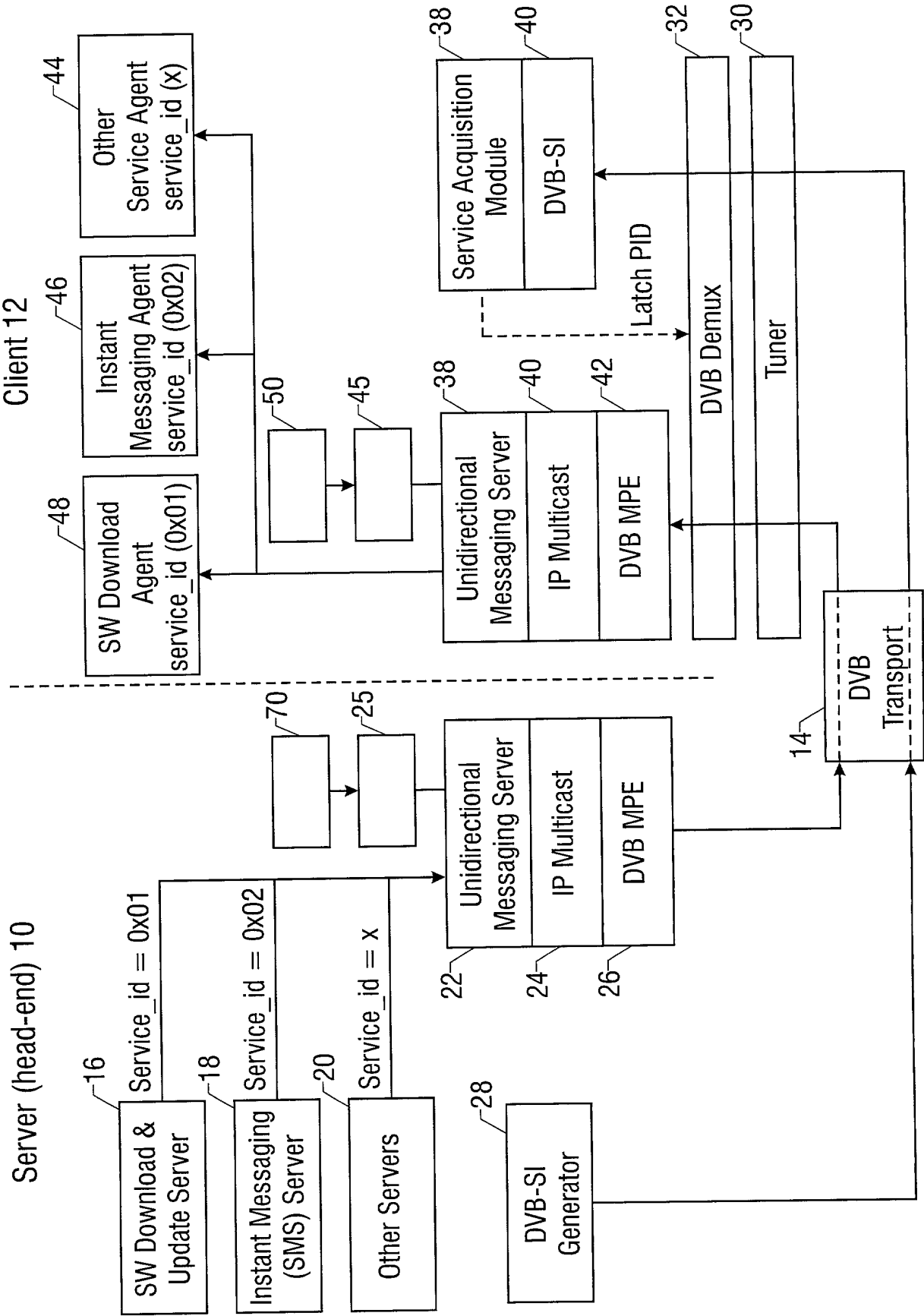


FIG. 1

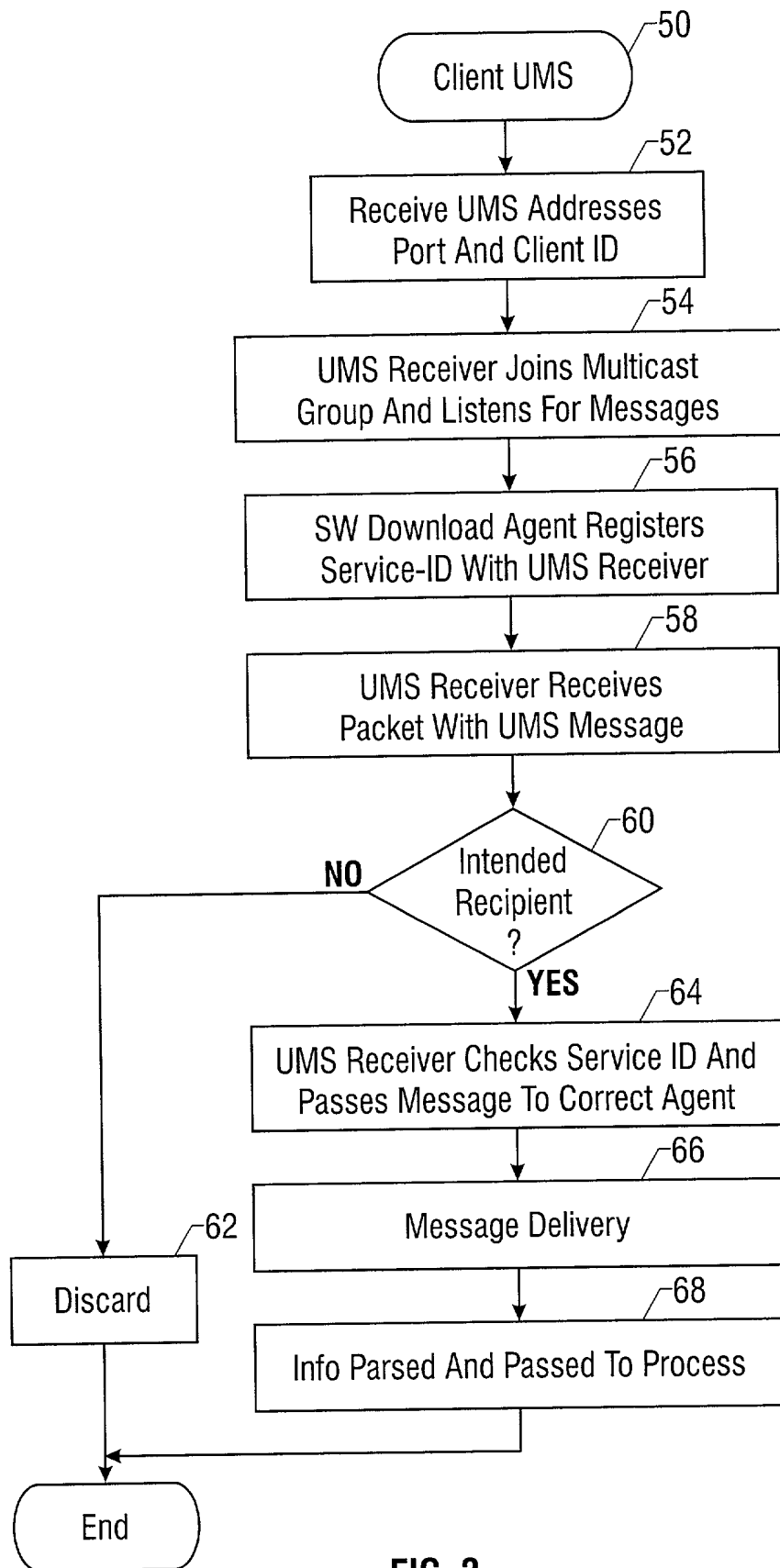


FIG. 2

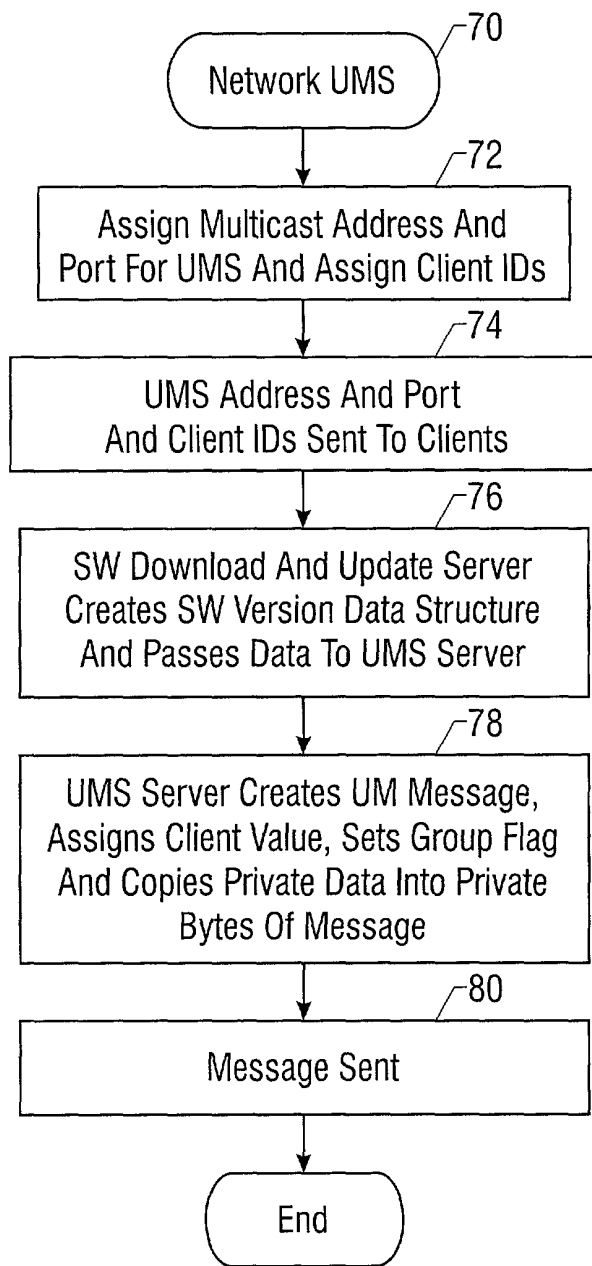


FIG. 3

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

CLIENT MESSAGING IN MULTICAST NETWORKS

the specification of which

X	is attached hereto.
	was filed on _____ as
	United States Application Number _____
	or PCT International Application Number _____
	and was amended on _____
	(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above. I do not know and do not believe that the claimed invention was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and that the invention has not been patented or made the subject of an inventor's certificate Issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (for a utility patent application) or six months (for a design patent application) prior to this application.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):			Priority Claimed	
Number	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under title 35, United States Code, Section 119(e) of the United States provisional application(s) listed below:

_____ (Application Number)	_____ (Filing Date)
_____ (Application Number)	_____ (Filing Date)

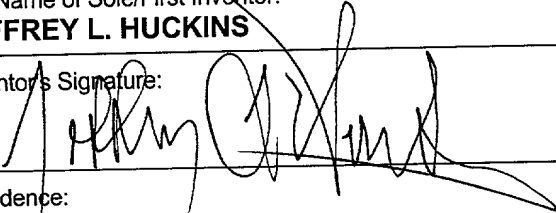
I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

_____ (Application Number)	_____ Filing Date	_____ (Status-patented, pending, abandoned)
_____ (Application Number)	_____ Filing Date	_____ (Status-patented, pending, abandoned)

I hereby appoint Timothy N. Trop, Reg. No. 28,994; Fred G. Pruner, Jr., Reg. No. 40,779 and Dan C. Hu, Reg. No. 40,025 my patent attorneys, of TROP, PRUNER & HU, P.C., with offices located at 8554 Katy Freeway, Ste. 100, Houston, TX 77024, telephone (713) 468-8880, and Mirho, Charles A.; Registration No. 41,199; Novakoski, Leo V.; Registration No. 37,198; Reynolds, Thomas C.; Registration No. 32,488; Seddon, Kenneth M.; Registration No. 43,105; Seeley, Mark; Registration No. 32,299; Skabrat, Steven P.; Registration No. 36,279; Skaist, Howard A.; Registration No. 36,008; Su, Gene I.; Registration No. 45,140; Wells, Calvin E.; Registration No. 43,256; Werner, Raymond J.; Registration No. 34,752; Winkle, Robert G.; Registration No. 37,474; and Young, Charles K.; Registration No. 39,435 my patent attorneys, of INTEL CORPORATION with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to Timothy N. Trop, TROP, PRUNER & HU, P.C., 8554 Katy Freeway, Ste. 100, Houston, TX 77024 and direct telephone calls to Timothy N. Trop, (713) 468-8880.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole/First Inventor: JEFFREY L. HUCKINS	
Inventor's Signature: 	Date: 8/18/00
Residence: CHANDLER, ARIZONA	Citizenship: U.S.
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